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To the rain-water, then, we do not look for a very large part of the nitrogen found in our ground water; much of it must come from the oxidation of the organic matter. \*The effort has been made to fix arbitrarily the maximum amount that will be allowed in natural waters before they shall be considered suspicious. Some of these attempts may be of interest by way of comparison:

Elkin, dangerous if over.....	6.00
Vienna Commission, dangerous if over.....	1.04
Hanover Commission, dangerous if over.....	2.60
Brandes Commission, dangerous if over.....	7.00

Leeds' average for American rivers is 1.11 to 3.89.

The Rivers Pollution Commission (English) gives the following average from 589 unpolluted waters for nitrogen as nitrates and nitrites together:

Rain .....	0.03
Upland surface.....	0.09
Deep well.....	4.95
Spring.....	3.83

Professor Mason also quotes from the *Analyst* the following, to show the varied character of well-waters:

	Nitrogen as nitrates.
200 feet deep, Wimbleton.....	0.43 parts per million.
900 " " Southend.....	0.71 " "
430 " " Braintree.....	0.28 " "
305 " " Colchester.....	0.00 " "
600 " " Whittham.....	6.43 " "
490 " " Chatham.....	6.85 " "
400 " " Norwich.....	11.43 " "

The above are deep wells which, as a rule, are more liable to contain nitrates than shallow wells. There is only one well in this list that contains as much nitrogen as the Marysville water, noticed above, namely, 9.10 parts per million. If this water alone contained a large amount of nitrogen as nitrates, we should be inclined to look upon it with suspicion, but an examination of the other wells in the town, some of which must have been so situated that they could not be polluted by sewage, leads to the conclusion that the *normal amount* of nitrates in the water of this locality is high. This conclusion but emphasizes the statement that has often been made by writers on water analysis, that the source of the abnormal ammonia, or nitrogen in any form, must be known before we are competent to decide on the quality of the water. If nitrates are high, we should not *necessarily* conclude that the water is contaminated by sewage, or even that it has previously been so contaminated.

## A REPORT ON THE MINERAL SPRINGS AND WELLS OF KANSAS.

BY E. H. S. BAILEY, LAWRENCE.

Read before the Academy December 30, 1898.

The chemistry department at the university is still working on the waters of the state, and has some kind of a record in regard to 150 springs and wells in the state that are of a so-called mineral character. Of these we have quantitative analyses of about seventy-five, and we have quite a number still on hand to analyze. Those who have investigated the subject appreciate the difficulty of deciding as to which waters are really to be called mineral, and which are simply ordinary waters.

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\* Report, National Board of Health, 1882.

In this list is to be found every grade of waters, perhaps as large an assortment as those of any state. Contrary to the generally accepted opinion, we have waters of exceptional purity as well as waters that are loaded with sulfates and chlorids almost to saturation. There are not many of the class that contain rare ingredients; or if these are present they are so only in extremely minute quantities. There are many, however, of that other class, namely, those that contain an excess of ordinary ingredients.

Most of the waters that have been examined are in the eastern half of the state, but there are some waters of special interest, like the Great Spirit spring, which are quite a distance west.

The mineral springs properties have been allowed to run down during the recent period of financial depression, and in many places the waters are practically out of use. But the waters are *there*; and, with greater financial prosperity in the state, there is no doubt that many of them will be bought up by capitalists and improved much beyond their former condition. As mineral springs resorts belong to the class known as "luxuries," they are very quick to respond to lack of ready money in the community, especially where they are so far away from the great centers of trade that they cannot draw patronage from the larger cities. They must first have local support, and this they will soon obtain with the increase of money in a community. Baths may be a necessity, but bread is of more importance, and will always be sought first by the people when financially oppressed.

There are indications in several parts of the state that mineral springs will soon again be of greater commercial and medicinal importance. Several new localities have been discovered and considerable money has been expended in improvements.

The analyses above referred to have come from several sources. In addition to the large number that have been carried on in the laboratory of the state university, many have been furnished by the kind coöperation of Professors Failyer and Willard of the agricultural college; Professor Knerr of Atchison; Professor Lovewell of Washburn; Professor Bushong of Emporia College, and others.

A large number of photographs of mineral springs properties has been taken, and a quantity of material collected for publication, which shows that the state has resources in this direction, only partially developed, it is true, but which will add very materially to her commercial wealth and importance.

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## SILICO BARITE NODULES FROM NEAR SALINA, KAN.

BY E. B. KNERR, ATCHISON.

Read before the Academy December 29, 1898.

I desire to call the Academy's attention to, and present samples for inspection of, some peculiar nodular concretions which were found in the bed of a small stream about six miles east of Salina, Kan. I am informed that these nodules are not at all uncommon in that neighborhood, and possibly the attention of other members of the Academy has been called to them before. I find that the explanations which are locally given accounting for these formations are of interest. One theory is that they are balls of rawhide petrified. The explanation is that at one time there was located in this valley an Indian storehouse of goods, and a large portion of the stock on hand consisted of balls of rawhide. A tornado came along and destroyed the lodge containing the goods, burying its con-